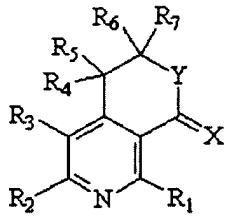
AMENDMENT TO THE CLAIMS

Please amend the claims without prejudice, without admission, without surrender of subject matter, and without any intention of creating any estoppel as to equivalents, as follows.

In the Claims:

1. (Currently amended) A compound or pharmaceutically acceptable salt of the following formula 1,



(1)

wherein R_1, R_2, ~~R_3~~, R_4, R_5, R_6 and R_7 are independently selected from the group consisting of a hydrogen atom, a halo, a cyano, a nitro, an acyl, a hydroxy, an amino, a C_1-C_6 low alkyl, a C_2-C_6 low alkenyl, a C_1-C_6 low alkoxy, a C_1-C_6 alkylthio, a C_1-C_{10} alkylamino, a C_4-C_9 cycloalkylamino, a C_4-C_9 heterocycloalkylamino, a C_1-C_{10} aralkylamino, an arylamino, an acylamino, a saturated heterocyclic, an acyloxy, a C_1-C_6 alkylsulfinyl, a C_1-C_6 alkylsulfonyl, a C_1-C_6 alkylsulfonylamino, an arylsulfinyl, an arylsulfonyl, an arylsulfonylamino, an aryl, a heteroaryl, a C_1-C_{10} aralkyl, a C_1-C_{10} heteroaralkyl, an aryloxy and a heteroaryloxy group;

R_3 is selected from the group consisting of a hydrogen atom, a halo, a cyano, a nitro, an acyl, a hydroxy, an amino, a C_1-C_6 low alkyl, a C_1-C_6 low alkoxy, a C_1-C_6 alkylthio, a C_1-C_{10} alkylamino, a C_4-C_9 cycloalkylamino, a C_4-C_9 heterocycloalkylamino, a C_1-C_{10} aralkylamino, an arylamino, an acylamino, a saturated heterocyclic, an acyloxy, a C_1-C_6 alkylsulfinyl, a C_1-C_6 alkylsulfonyl, a C_1-C_6 alkylsulfonylamino, an arylsulfinyl, an arylsulfonyl, an arylsulfonylamino, an aryl, a heteroaryl, a C_1-C_{10} aralkyl, a C_1-C_{10} heteroaralkyl, an aryloxy and a heteroaryloxy group;

or R_1, R_2, R_3, R_4, R_5, R_6 and R_7 independently form a ring by binding with a neighboring

substitution group;

R_3 is

X is an oxygen or sulfur atom;

Y is an oxygen atom or N-R_8, wherein R_8 is selected from the group consisting of a hydrogen atom, a C_1-C_6 low alkyl, an acyl, an aryl, a heteroaryl, a C_1-C_{10} aralkyl and a C_1-C_{10} heteroaralkyl group; or forms a ring by binding with a neighboring substitution group of R_6 or R_7;

said aryl group is selected from a phenyl, a naphthyl and a fused phenyl group;

said heteroaryl and saturated heterocyclic groups are a heterocyclic ring with a pentagonal or hexagonal shape having 1 to 3 heteroatoms selected from an oxygen, a nitrogen, and a sulfur atom; or a fused heterocyclic ring; and

said aryl and heteroaryl groups are such that 1 to 4 substitution groups selected from the group consisting of a halo, a hydroxy, a C_1-C_6 low alkyl, a C_1-C_6 low alkoxy, an amino, a cyano, a nitro, a carbonyl and a carboxyl group are substituted.

2. (Currently amended) ~~In~~ The compound or pharmaceutically acceptable salt of claim 1, wherein said X and Y are independently an oxygen atom.

3. (Currently amended) ~~In~~ The compound or pharmaceutically acceptable salt of claim 1, wherein said R_1, R_2 and R_3 are independently selected from the group consisting of a hydrogen atom, a halo, a hydroxy, a C_1-C_6 low alkyl, a C_2-C_6 low alkenyl, a C_1-C_6 low alkoxy, an aryloxy, an amino, a C_1-C_6 alkylamino, a C_1-C_{10} aralkylamino, an arylamino, an acylamino, a saturated heterocyclic, an aryl, a heteroaryl, and a C_1-C_{10} heteroaralkyl group; or neighboring R_2 and R_3 form a ring by binding with each other;

said R_4, R_5, R_6 and and R_7 are independently selected from the group consisting of a

hydrogen atom, a C_1-C_6 low alkyl and an aryl group; or R_4, R_5, R_6 and and R_7 independently form a ring by binding with a neighboring substitution group;

X is an oxygen or sulfur atom;

Y is an oxygen atom or N-R_8, wherein R_8 is selected from the group consisting of a hydrogen atom, a C_1-C_6 low alkyl, an aryl, and a C_1-C_{10} aralkyl group;

said aryl group is a phenyl group;

said heteroaryl and saturated heterocyclic groups are selected from furan, thiophene, pyridine, piperidine, piperazine, morpholine, pyrolidine and benzodioxol; and

said aryl and heteroaryl groups are such that 1 to 4 substitution groups selected from the group consisting of a halo, a hydroxy, a C_1-C_6 low alkyl, a C_1-C_6 low alkoxy, an amino, a cyano, a nitro, a carbonyl and a carboxyl group are substituted.

4. (Currently amended) ~~In~~ The compound or pharmaceutically acceptable salt of claim 1, wherein said compound of formula 1 is selected from the group consisting of

3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

5-vinyl-3,4-dihydro-pyrano [3,4-*c*]pyridine-1-on,

6,8-dichloro-3,4-dihydro-pyrano [3,4-*c*]pyridine-1-on,

6,8-dihydroxy-3,4-dihydro-pyrano [3,4-*c*]pyridine-1-on,

8-hydroxy-6-methyl-3,4-dihydro-pyrano [3,4-*c*]pyridine-1-on,

8-chloro-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-1-oxo-3,4-dihydro-1*H*-pyrano[3,4-*c*]pyridine-8-yl acetic ester,

8-methoxy-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6,8-dimethyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-furan-2-yl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-thiophene-2-yl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-pyridine-2-yl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-(4-fluoro-phenyl)-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-(4-chloro-phenyl)-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-piperidine-1-yl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-morpholine-4-yl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-(4-methyl-piperazine-1-yl)-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-(4-pyrimidine-2-yl-piperazine-1-yl)-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-(4-fluoro-phenylamino)-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-(4-chloro-phenylamino)-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-(4-trifluoromethyl-phenylamino)-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-*p*-tolylamino-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-phenylamino-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-phenetylamino-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-[(benzo[1,3]dioxol-5-ylmethyl)-amino]-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-8-phenoxy-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-benzylamino-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-(4-methoxy-benzylamino)-6-methyll-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-amino-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-acetamido-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-benzamido-6-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-hydroxy-6-methyl-5-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-chloro-6-methyl-5-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-methyl-5-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-hydroxy-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-chloro-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-methyl-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

1-oxo-6-phenyl-3,4-dihydro-1*H*-pyrano[3,4-*c*]pyridine-8-yl acetic ester,

8-methoxy-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-methylamino-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-dimethylamino-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-phenyl-8-piperidine-1-yl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-morpholine-4-yl-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-phenyl-8-pyrolidine-1-yl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-(4-fluoro-phenylamino)-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-(4-methoxy-benzylamino)-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,,

8-amino-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-acetamido-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-benzamido-6-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-hydroxy-8-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-chloro-8-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-methyl-6-(thiophene-2-yl)-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-(furan-2-yl)-8-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-(benzo[d][1,3]dioxol-6-yl)-8-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-(4-(dimethylamino)phenyl)-8-methyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-hydroxy-6-propyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-chloro-6-propyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-propyl-6-chloro-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-morpholine-4-yl-6-propyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

1-oxo-6-propyl-3,4-dihydro-1*H*-pyrano[3,4-*c*]pyridine-8-yl acetic ester

8-(4-methoxy-benzylamino)-6-propyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-amino-6-propyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

N-(1-oxo-6-propyl-3,4-dihydro-1*H*-pyrano[3,4-*c*]pyridine-8-yl)-acetamide,

3,4-dihydro-2-oxa-aza-phenanthrene-1-on,

3,4-dihydro-pyrano[3,4-*c*]pyridine-1-thione,

2-(4-methoxy-benzyl)-3,4-dihydro-2*H*-[2,7]naphthyridine-1-on,

3,4-dihydro-2*H*-[2,7]naphthyridine-1-on,

2-benzyl-3,4-dihydro-2*H*-[2,7]naphthyridine-1-on,

3-phenyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

3-phenyl-3,4-dihydro-2*H*-[2,7]naphthyridine-1-on,

8-methyl-6-phenyl-3,4-dihydro-2*H*-[2,7]naphthyridine-1-on,

2,8-dimethyl-6-phenyl-3,4-dihydro-2*H*-[2,7]naphthyridine-1-on,

2-benzyl-8-methyl-6-phenyl-3,4-dihydro-2*H*-[2,7]naphthyridine-1-on,

6-cyclohexyl-8-hydroxy-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-cyclohexyl-1-oxo-3,4-dihydro-1*H*-pyrano[3,4-*c*]pyridine-8-yl acetic acid methyl ester,

8-chloro-6-cyclohexyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-cyclohexyl-8-piperidine-1-yl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-cyclohexyl-8-(4-mthoxy-benzylamino)-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-amino-6-cyclohexyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

8-hydroxy-6-isopropyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

6-isopropyl-1-oxo-3,4-dihydro-1*H*-pyrano[3,4-*c*]pyridine-8-yl acetic acid methyl ester,

8-chloro-6-isopropyl-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on,

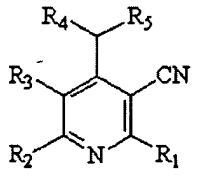
6-isopropyl-8-(4-methoxy-benzylamino)-3,4-dihydro-pyrano[3,4-*c*]pyridine-1-on; and their pharmaceutically acceptable salts.

5. (Currently amended) A method for preparing a compound of the following formula 1 comprising:

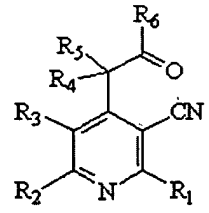
(a) reacting a compound of the following formula 2 with an alkylester compound containing the variable R_6 in the presence of a base to obtain a compound of the following formula 3;

(b) reacting said compound of the following formula 3 with a reducing agent or a metal reagent containing the variable R_7 at 0 °C or room temperature to obtain an alcohol compound of the following formula 4; and

(c) performing a cyclization of said alcohol compound of the following formula 4 to obtain a compound of the following formula 1,



(2)



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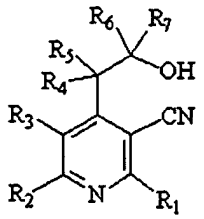
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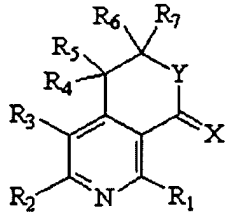
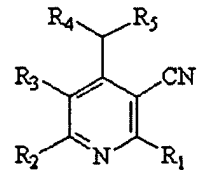

(1)

wherein R_1, R_2, R_3, R_4, R_5, R_6, and R_7 are the same as defined in claim 1, and X and Y individually represent an oxygen atom.

6. (Original) A method for preparing a compound of the following formula 1 comprising:

(a) reacting a compound of the following formula 2 with an alkylcarbonyl compound represented by R_6COR_7 in the presence of a base to obtain a compound of the following formula 4; and

(b) performing a cyclization of said alcohol compound of the following formula 1,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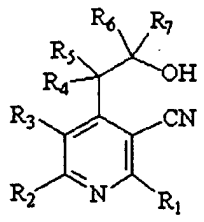
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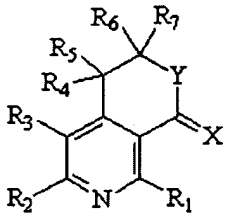


(1)

wherein R_1, R_2, R_3, R_4, R_5, R_6, and R_7 are the same as defined in claim 1, and X and Y individually represent an oxygen atom.

7. (Currently amended) ~~In~~ The method of claim 5, wherein said alkylester compound containing the variable R_6 is represented by R_6COOCH_3.

8. (Currently amended) ~~In~~ The method of claim 5, wherein said metal reagent containing the variable R_7 is a Grignard reagent of R_7M, wherein M is an alkali metal, or R_7MgX^1, wherein X is a halogen atom).

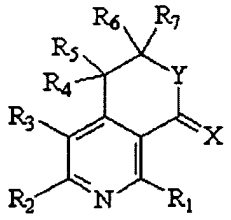
9. (Currently amended) ~~In claim 5 or claim 6,~~ The method of claim 5, wherein said base is selected from the group consisting of lithium bis(trimethylsilyl)amide, potassium bis(trimethylsilyl)amide, lithium diisopropylamide, sodium hydride, potassium hydride and lithium hydride.

10. (Currently amended) ~~In claim 5 or claim 6,~~ The method of claim 5, wherein said cyclization is performed by using a strong acid reagent of conc. HCl.

11. (Original) A method for preparing a compound of the following formula 1 comprising:

(a) reacting a compound of the following formula 1, wherein X and Y are individually an oxygen atom, with an amine compound represented by R_8NH_2 to obtain a compound of the following formula 8; and

(b) performing a cyclization of said compound of the following formula 8 to obtain a compound of the following formula 1, wherein X is an oxygen atom and Y is N-R_8,



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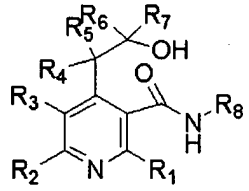
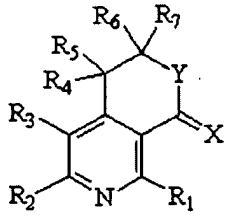


(8)

wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, X and Y are the same as defined in claim 1.

12. (Currently amended) ~~In~~ The method of claim 11, wherein said cyclization is performed by using diethyl azodicarboxylate and triphenylphosphine.

13. (Currently amended) A pharmaceutical composition having an inhibitory effect on the production of cytokines wherein said composition comprises a compound of the following formula 1 or its pharmaceutically acceptable salt,

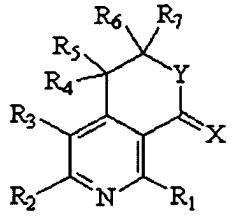


(1)

wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, X and Y are the same as defined in claim 1 and a pharmaceutically acceptable carrier.

14. (Currently amended) ~~In~~ The pharmaceutical composition of claim 13, wherein said cytokine is TNF-α.

15. (Currently amended) A pharmaceutical composition ~~therapeutic agent~~ comprising a compound of the following formula 1 or its pharmaceutically acceptable salt effective in treating inflammatory diseases,

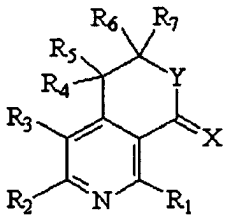


(1)

wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, X and Y are the same as defined in claim 1 and a pharmaceutically acceptable carrier.

16. (Currently amended) ~~In~~ The pharmaceutical composition of claim 15, wherein said inflammatory diseases are selected from the group consisting of rheumatic arthritis, multiple sclerosis, Crohn' disease, ulcerative colitis, graft-versus-host disease, systnemic erythematosus lupus, toxic shock syndrome, osteoarthritis and insulin-dependent diabetes.

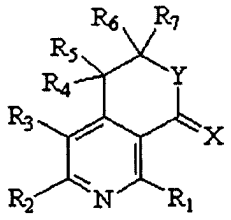
17. (Currently amended) A pharmaceutical composition ~~therapeutic agent~~ having an anti-inflammatory and analgesic effect comprising a compound of the following formula 1 or its pharmaceutically acceptable salt,



(1)

wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, X and Y are the same as defined in claim 1 and a pharmaceutically acceptable carrier.

18. (Currently amended) A pharmaceutical composition ~~therapeutic agent~~ for treating immune-related diseases comprising a compound of the following formula 1 or its pharmaceutically acceptable salt,

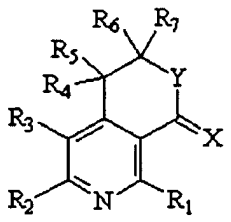


(1)

wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, X and Y are the same as defined in claim 1 and a pharmaceutically acceptable carrier.

19. (Currently amended) ~~In~~ The pharmaceutical composition of claim 18, wherein said immune-related diseases are selected from the group consisting of glomerulonephritis, dermatitis, asthma, stroke, cardiac infarction, acute respiratory distress syndrome, postinjury multiple organ failure, purulent meningitis, necrotizing enterocolitis, parahemodialysis syndrome, septic shock, and post-menopausal osteoporosis.

20. (Currently amended) A pharmaceutical composition ~~therapeutic agent~~ for treating chronic inflammatory diseases comprising a compound of the following formula 1 or its pharmaceutically acceptable salt,



(1)

wherein R_1, R_2, R_3, R_4, R_5, R_6, R_7, X and Y are the same as defined in claim 1 and a pharmaceutically acceptable carrier.

21. (Currently amended) ~~In~~ The pharmaceutical composition of claim 20, wherein said chronic inflammatory diseases are psoriatic arthritis, psoriatis, ankylosing spondylitis, adult-onset Still's disease, polymyositis, dermatomyositis, vasculitis, Behçet's disease ~~or vasculitis such as Behcet disease~~ and Wegener's granulomatosis.